CrossRiver**Rail**

17. Waste Management

Cross River Rail

CHAPTER 17
WASTE MANAGEMENT

JULY 2011

Contents

17 Waste management

17.1 Introduction

This chapter addresses Section 3.9 of the Cross River Rail Terms of Reference. It identifies and describes the potential waste production and waste management during the construction and operations phases of Cross River Rail (the Project). An inventory of likely waste products is provided and proposed management strategies are identified in line with the *Environmental Protection (Waste Management) Policy 2000* and the *Environmental Protection (Waste Management) Regulation 2000*.

This chapter:

- identifies on-site and off-site storage requirements and treatment of wastes. Where off-site disposal of waste is proposed, the locations of likely disposal facilities and transportation requirements are identified.
- details the structure and content of the Waste and Resource Recovery Management Plan which will form part of the final Environmental Management Plan for the Project.

Further information regarding specific waste streams generation and management are discussed in other EIS chapters as follows:

- acid sulphate soils – **Chapter 7 Topography, Geology, Geomorphology and Soils**
- contaminated soil – **Chapter 8 Land Contamination**
- groundwater management – **Chapter 12 Groundwater**
- surface water management – **Chapter 13 Surface Water.**

The waste streams likely to be produced by the Project are described in **Section 17.5** and are listed in the waste inventory (**Appendix H**). The waste streams are categorised into general solid waste, inert waste, green waste, recyclable and regulated waste and the activity which generates each waste stream is listed.

17.2 Waste management legislation and policy

17.2.1 Legislative framework

Waste management in Queensland is governed by the:

- *Environmental Protection Act 1994* (EP ACT)
- *Environmental Protection Regulation 2008*
- *Environmental Protection (Waste Management) Policy 2000* (EPP (Waste))
- *Environmental Protection (Waste Management) Regulation 2000.*

The *Environment Protection (Waste Management) Regulation 2000* and the EPP (Waste) seek to achieve the objectives of the EP Act and set the legislative framework governing Queensland's waste management strategy and plan. The framework includes:

- adoption of a waste management hierarchy
- assigning responsibility for waste management
- outlining specific mechanisms for waste management planning.

17.2.2 Queensland Government recycling policy

The Department of Public Works developed a whole of government Recycling Policy for Buildings and Civil Infrastructure for Queensland called the *Recycling Policy for Building and Civil Infrastructure 2009* (Recycling Policy). The Recycling Policy states:

> *The Queensland Government is committed to maximising the resource recovery of materials used in building and civil infrastructure projects in order to help conserve natural resources and contribute to ecologically sustainable development. (Queensland Department of Public Works, 2009)*

The Recycling Policy is applicable to designated projects involving construction, refurbishment and/or demolition of buildings or civil infrastructure under the control of Queensland Government departments and Government Owned Corporations.

The Recycling Policy would be incorporated into the waste management objectives for the Project where practicable.

17.2.3 Queensland waste strategy

Queensland's *Waste Reduction and Recycling Strategy 2010 – 2020* was adopted in December 2010. The strategy's broad goals are to:

- reduce waste
- optimise recovery and recycling
- develop sustainable waste industries and jobs.

To achieve these goals, the strategy has identified priority products and sectors and has set clear targets for reducing waste. Over the next decade, Queensland will:

- reduce waste to landfill by 50%
- reduce landfill gas emissions by 50%
- increase the recovery and recycling of resources across all waste streams
- reduce generation of waste
- reduce the total amount of, and the environmental impacts from, litter and illegal dumping.

The strategy also introduces a waste disposal levy as a price signal to change disposal behaviour, to be charged in addition to the normal gate fee at waste disposal facilities. Details on the proposed levy rates are provided in **Table 17-1.**

Table 17-1 Proposed Queensland industry waste levy rates

Waste Stream	Proposed Disposal Levy amount[1]
Commercial and industrial waste	$35 per tonne
Construction and demolition waste	$35 per tonne
Contaminated and acid sulphate soils	$35 per tonne
Lower hazard regulated waste	$50 per tonne
Higher hazard regulated waste	$150 per tonne
Municipal solid waste	$0 per tonne

Note:
1. Levy amount current as per Queensland's Waste Reduction and Recycling Strategy 2010 – 2020

The target date for implementation of the waste levy is 1 December 2011. As part of detailed design, it would need to be determined whether the Project is eligible for exemptions from the levy for the disposal of waste. This would be determined following release of the final strategy.

17.3 Project waste management principles

To demonstrate best practice in accordance with the governing legislative framework, the waste management strategy for the Project would follow the principles of:

- avoidance
- reuse
- recycle
- recovery
- disposal.

While these principles lead towards best practice, it is recognised that they are not always achievable and/or practicable due to the nature of the waste product, the availability of capable receiving facilities, the health and safety implications and the associated costs that may be involved. With respect to these issues, the principles that have been adopted for the Project are outlined within the hierarchy as follows.

17.3.1 Avoid and reduce

Opportunities for avoiding waste generation and, if avoidance is not possible, reducing waste generation onsite would be identified. Strategies for reducing waste would be detailed in the Waste and Resource Recovery Management Plan and may include:

- utilising materials and products that have a recycled content wherever they are cost-and-performance competitive, and where environmentally preferable to the non-recycled alternative
- developing and implementing systems to identify, quantify and monitor waste generation
- implementation of project office sustainability measures through the selection of energy and resource efficient goods and equipment eg low wattage fluorescent lighting, inverter air conditioning, insulated panelling to reduce energy consumption, waterless urinals, foot pedal or automatic shutoff hand wash basins and rainwater harvesting to reduce water consumption
- ordering goods in bulk to minimise packaging waste and develop contract conditions / arrangements with suppliers to reduce the quantity of packaging materials supplied with building materials and return of packaging materials to the supplier
- making arrangements with suppliers to return any construction materials not used
- training staff to avoid and reduce construction waste.

17.3.2 Reuse

Reuse is a process by which waste otherwise destined for disposal is cleaned, processed or repaired for use, for the purposes of prolonging the original product lifetime prior to treatment or reprocessing. Strategies for the reuse of products during construction may include:

- developing demolition procedures which facilitate recovery of materials for reuse, segregation of different types of materials for recycling in preference to demolish and dispose
- identifying pre-war and character dwellings on properties to be resumed, particularly in the Yeerongpilly area, which are suitable for reuse. It may be possible to engage a house salvage contractor to remove and relocate identified dwellings and make available for resale.

- identifying other buildings to be removed and providing salvaging contractors with the opportunity to salvage (remove) building materials prior to demolition so that items can retain their value and be reused
- chipping and mulching of vegetation cleared during construction and reuse of mulched material for landscaping purposes
- stockpiling of topsoil free of weeds and storage for reuse where practicable
- reusing clean excavated material wherever practicable
- reusing waste concrete and pavements for road construction (sub-base layer) or as hard stand areas in construction compounds or crushed and used for construction of haul paths, erosion and sediment controls such as at entry/exit points and for lining temporary drainage lines
- training staff to identify opportunities to reuse material during construction
- engaging a salvage specialist to identify opportunities in the open market for reuse of materials that are not able to be reused in the Project.

17.3.3 Recycle

Recycling is a process by which waste material (otherwise destined for disposal), is collected, sorted, reprocessed or remanufactured and is then used to make another product.

As stated previously, the targets set by the Recycling Policy would be adopted where practicable. The Guidelines to the Recycling Policy provides reporting templates, weight/volume conversion chart, Code of Practice Guidelines, guidance on Construction Site Management, list of Construction and Demolition (C&D) Resource Use Opportunities and C&D Waste Stream material types and potential end uses.

Strategies for reuse of materials and recycling during the Project's demolition and construction activities may include:

- collection of kerb and pavement materials and transport to crushing and recycling plants
- provision of recycling facilities for general rubbish, that is glass, plastic, waste paper and metals, using colour-coded bins
- collection of demolition materials for transportation to a resource recovery and recycling depot where reuse on site is not possible
- segregation of demolition materials by type to facilitate recycling and resource recovery efforts.

17.3.4 Recovery

Resource recovery means finding uses for waste by way of reuse, recycling, processing or energy recovery. Resource recovery is recovering materials and end-of-life products from the waste stream that have a reuse, recycling or energy value. Materials recovered can be used in the manufacture of new products. Recovery of value includes energy by utilising components of waste as a fuel, production of compost using organic solid waste as a medium, and reclamation of land.

Strategies for recovery of waste may include:

- recovery of fixtures such as lights and other electrical fittings, doors, wash basins, toilets, windows and sheds through sales and/or charity organisations
- recovery of rail infrastructure for later use such as ballast, rail tracks, concrete sleepers, gantries, signals and fencing
- recovery of historical relics or features of interest for historical records
- recovery of character houses and materials from heritage structures

- deconstruction of buildings in a manner that enables recovery of materials
- engaging a salvage specialist to identify opportunities for resource recovery.

If recovered items and materials are to be sold this should occur in line with due government processes for disposing of such items and materials in a commercial market.

17.3.5 Disposal

Waste unable to be reused, recycled or recovered would be disposed of in appropriately licensed commercial landfill site/s with appropriate regulatory approvals.

17.4 Waste and Resource Recovery Management Plan

The final Environmental Management Plan (EMP) for the Project would include a Waste and Resource Recovery Management Plan (WRRMP). The WRRMP would contain the principles within the EP Act, *Environmental Protection (Waste Management) Regulation 2000* and the *Environmental Protection (Waste Management) Policy 2000* and Queensland's *Waste Reduction and Recycling Strategy 2010 – 2020*.

The WRRMP would provide management processes for key waste streams and guidance on the adoption of the waste hierarchy, as defined in **Section 17.3,** for managing project waste. The proposed contents of this plan are further described in **Section 17.7**.

The reporting requirements of the Recycling Policy and the guideline are to be included within the Waste and Resource Recovery Management Plan. This is to demonstrate that reasonable avoidance, reuse, recycling and recovery measures during the construction phase have been undertaken to reach the agreed by weight reduction target.

The Guidelines to the Recycling Policy state that:

> *All Queensland Government departments and Government Owned Corporations and Companies are required to develop a resource (waste) recovery program for all recyclable materials in any significant government building or form of infrastructure that is being demolished or redeveloped, and to seek practicable and cost-effective opportunities for recycling and reuse of those materials used in building and civil infrastructure projects where Resource Recovery Transfer Centres are established.* (Department of Public Works, 2009)

The Recycling Policy states a minimum target to recover construction and demolition waste material from landfill of 40% recycling or reuse of each Waste Material Type, within the Total Waste Material Composition of each designated project for government buildings and civil infrastructure projects involving construction, refurbishment and/or demolition[1]. This target would be confirmed through the detailed design process.

17.4.1 Performance requirements

Records would be kept to track waste from source to disposal or destination for resource recovery. Waste receiving facilities would be assessed for suitability and audited to ensure conformance with the EMP and the WRRMP. Records/receipts of the type and quantity of all waste for disposal and other materials removed for resource recovery would be maintained. Resources such as water, fuel and electricity use would also be monitored with records updated on a quarterly basis. Resource usage is further addressed within **Chapter 6 Climate Change and Sustainability**.

[1] Note: Each Waste Material Type is expressed by weight and as a percentage of material type by weight of the total amount of Waste Material Type within the Total Waste Material Composition of each designated project.

17.5 Waste generation

17.5.1 Potential waste streams

There is potential for a variety of solid and liquid wastes to be generated during the construction and operations phases of Cross River Rail. Significantly less waste is expected to be generated during the operation of the Project compared with its construction phase. Waste generated by the Project can be divided into the following categories:

- construction and demolition waste
- operational waste.

The waste streams and quantities of waste likely to be produced by the Project are described in **Section 17.5.2** to **Section 17.5.3** and listed in the waste inventory (**Appendix H**). The waste streams are categorised into general solid waste, inert waste, green waste, recyclable and regulated waste. In addition, the activity which generates the waste is listed.

17.5.2 Construction and demolition waste

Solid waste materials would be generated by the construction, remodelling, renovation, repair, alteration, or demolition of buildings (including residential, commercial, government or institutional buildings and industrial facilities) and civil infrastructure (including general infrastructure-type developments such as roads, bridges, dams, tunnels, railways, power plants, ports and marinas).

Construction and demolition waste may include concrete, timber, plasterboard, bricks, tiles, steel reinforcing, asbestos sheeting, cardboard, plastic wrap and general waste. The quantity and type of construction and demolition waste is site specific and dependent on the location within the study corridor, land uses, design features and construction methodologies.

A schedule of the proposed demolitions associated with the Project is listed in **Table 17-2**.

Table 17-2 Demolition works

Proposed Demolition Location	Description
North portal	Demolition/relocation of low-rise buildings and sheds and railway corridor infrastructure
Roma Street Station north	Demolition of part of existing structures including part of the platform. demolition of part of subway; demolition of baggage shed; demolition of railway corridor infrastructure
Roma Street Station central	Demolition of part of existing structures, railway corridor infrastructure, platform. Demolition of part of subway – including toilet block
Roma Street Station south	None
Albert Street Station north	Demolition of low-rise buildings on corner of Albert and Mary streets
Albert Street Station south	Demolition of high-rise hotel building and car park
Gabba Station	Demolition of Go-print building
Boggo Road Station	Demolition / relocation of Park Road Station entrance
Ventilation and emergency access building	No demolition
Southern portal	Demolition/relocation of low-rise housing/dwellings; demolition of low-rise industrial buildings and railway corridor infrastructure

Source: AECOM, Reference Design Construction Issues, 2010

The major waste streams generated during the demolition phase are summarised in **Table 17-3** and are described in the sections below and in **Appendix H** Waste Inventory:

Table 17-3 Demolition phase waste types and classification

Waste Types and Classification		
Type	**Activity**	**Waste Category/Classification**
Ballast	Demolition within rail corridor	Inert material with potential coating of creosotes and arsenic (reuse in rail corridor)
Rail track	Demolition within rail corridor	Inert
Sleepers (wood)	Demolition within rail corridor	Inert material contaminated with arsenic and creosote
Sleepers (concrete)	Demolition within rail corridor	Inert material with potential coating of creosotes and arsenic
Overhead and underground electrical cable/wire	Demolition within rail corridor	Inert
Steel masts	Demolition within rail corridor	Inert
Gantries	Demolition within rail corridor	Inert
Fencing	Demolition within rail corridor	Inert
Signals	Demolition within rail corridor	General solid waste potentially recyclable
Concrete structures - mast foundation, service trenches/pits and switch foundations	Demolition within rail corridor	Inert material possible asbestos in service pipes and older buildings
Lights	Demolition within rail corridor	General solid waste potentially recyclable
Switch gear	Demolition within rail corridor	General solid waste potentially recyclable
Excavated soil	Demolition within rail corridor	Regulated waste - soil contaminated with arsenic and creosote
Buildings	Demolition within rail corridor	Inert material possible asbestos in older buildings
Concrete, bricks, tiles	Demolition of industrial, commercial and residential properties	Inert
Timber (untreated)	Demolition of industrial, commercial and residential properties	Inert
Timber (treated)	Demolition of industrial, commercial and residential properties	General solid waste
Metals (ferrous and non ferrous)	Demolition of industrial, commercial and residential properties	Inert
Plaster board	Demolition of industrial, commercial and residential properties	Inert

Waste Types and Classification		
Type	**Activity**	**Waste Category/Classification**
Asbestos products (ie sheeting)	Demolition of industrial, commercial and residential properties	Regulated waste
Carpets	Demolition of industrial, commercial and residential properties	General solid waste
Electrical and plumbing fittings	Demolition of industrial, commercial and residential properties	Inert
Furnishings eg furniture, doors and windows	Demolition of industrial, commercial and residential properties	Inert
Hazardous waste eg hydrocarbons, chemicals, paints	Demolition of industrial, commercial and residential properties	Regulated waste
Bitumen, road base aggregates, soil and concrete	Demolition of roads	Inert
Infrastructure associated with public utilities/services, signals and associated cables	Demolition of roads	Inert
Electrical insulation – oil filled (potential PCB contaminated) or SF_6 (Sulphur hexa fluoride)	Demolition of electrical equipment – electrical switchgear and control gear	Regulated waste
General domestic waste and food waste	Crib rooms and site offices and demolition of residential properties	General solid waste
Green waste and vegetation	Clearing and grubbing activities – all land use types	Green waste (organic)
Contaminated soil	Clearing and grubbing activities – all land use types	Regulated waste

Demolition activities within rail corridor

In addition to the waste items listed in **Table 17-3**, some hazardous materials may be encountered during demolition works in the rail corridor such as:

- asbestos in service pipes and older buildings
- creosotes and arsenic in wooden sleepers, ballast and soils.

Commercial and residential properties

Older commercial and residential properties also have the potential to contain asbestos. Asbestos materials and treatment are discussed further in **Section 17.7.4**.

Industrial properties

In addition to building materials similar to commercial and residential properties, there is also the potential for hazardous wastes such as hydrocarbons, chemicals and paints depending on the type of industry. The quantity and type of waste generated during demolition works at such properties would need to be assessed on a property by property basis and managed appropriately.

Roads

The dominant wastes that are generated from demolition of roads include bitumen, road base aggregates and soil, concrete, infrastructure associated with public utilities/services, signals and associated cables.

Electricity supply infrastructure requiring demolition such as electrical switchgear and control gear may contain canisters of sulphur hexafluoride (SF_6) gas. SF_6 is a powerful greenhouse gas with greenhouse warming potential 23,900 times greater than carbon dioxide. Older electricity infrastructure will have oil-filled electrical insulation which has the potential to be contaminated with polychlorinated biphenyls (PCBs).

Green waste and vegetation

The clearing and grubbing activities associated with the initial surface works and construction site preparation have the potential to generate some green wastes within all land use types.

Building works

Building materials associated with the Project would be significant and extensive. A comprehensive list of the building materials to be utilised during the Project would be determined during the detailed design stage. However likely wastes generated from building works would include the following:

- scrap metal, steel
- timber formwork
- concrete
- pavements
- plasterboard, geotextiles and geosynthetic materials
- cable and pipework offcuts
- packaging materials.

Materials delivered to site often come with packaging material which is discarded as soon as the materials are required for use. Packaging can include pallets, plastic wrapping, polystyrene products, and cardboard. The quantities of waste materials from building and other construction activities are usually minimised by contractors in order to control and minimise cost of materials purchased and waste disposal charges.

The major waste streams generated during the construction phase are described in **Table 17-4** and following sections.

Table 17-4 Construction phase waste types and classification

Waste Types and Classification		
Type	**Activity**	**Waste Category/Classification**
Green waste and vegetation	Clearing and grubbing activities associated with the initial surface works and construction site preparation – all land use types	Green waste (organic)
Packaging material - pallets, plastic wrapping, polystyrene products, and cardboard	Construction activities - delivery of materials and store yard waste	General solid waste - if segregated some components are potentially recyclable
Scrap metal and steel	Construction activities	Inert
Timber formwork (untreated)	Construction activities	Inert
Timber formwork (treated)	Construction activities	General solid waste
Concrete	Construction activities	Inert
Pavements	Construction activities	Inert
Plasterboard, geotextiles and geosynthetic materials	Construction activities	Inert
Cable, conduit and pipework offcuts	Construction activities	Inert
Neutralised acid sulphate soil	Construction activities	Inert
Contaminated soil	Construction activities	Regulated waste
Acid sulphate soil	Construction activities	Regulated waste
Tyres, batteries, adhesives, lubricants, cleaning agents, fuels, engine coolant, waste oil, oily rags, antifreeze and radiator coolants, aerosol cans, waste paint and solvents	Minor maintenance (cleaning and small repairs) and vehicle refuelling of heavy machinery (construction equipment) and the TBM	Regulated waste
Silt and sediment	Maintenance of erosion and sediment control devices at construction areas	General solid waste
Waste from food consumption by workers - glass, aluminium cans, plastic bottles, paper, cardboard	Construction activities, crib rooms and site offices	General solid waste - if segregated potentially recyclable
Treated water originating from groundwater and equipment washdown	Water management system	Liquid waste
Water-borne sludges or residue	Wastewater treatment plant	Regulated waste
Absorbent materials and spent spill kit materials	Refuelling pads/areas of construction sites	Regulated waste
Medical and first aid station waste	First aid treatable injuries sustained by workers during construction activities	General solid waste

Excavation works

Excavation works are required at properties on the Contaminated Land Register and Environmental Management Register. Excavation works are also required in areas mapped as having acid sulphate soils (ASS). Excavation and removal of contaminated soil and ASS may be required subject to the findings of the site investigations. Contaminated soil and ASS management is addressed within **Chapter 8 Land Contamination** and **Chapter 7 Topography, Geology, Geomorphology and Soils** respectively.

Once ASS is treated and validated as being neutralised, this material can be considered as excavated material.

Construction of the underground stations, emergency access and ventilation shaft, rail tunnels and cross-passages would generate a large quantity of spoil material, estimated at approximately 1.4 million cubic metres (refer to **Chapter 4 Project Description**). This material is not considered as waste material. Separate handling, transport and placement arrangements are proposed and described in Chapter 4.

Maintenance of erosion and sediment control devices

Silt and sediment removed during maintenance of erosion and sediment control devices is considered a waste material from the Project. This material has the potential to be contaminated and generally would be unsuitable for reuse. Such material would need to be disposed to a general waste landfill.

Maintenance and refuelling activities

Heavy vehicles and construction equipment would be used during the construction phase. Scheduled regular maintenance, cleaning and refuelling would occur at the major worksites (Yeerongpilly, Woolloongabba). Most servicing and maintenance activities of mobile plant and equipment at the CBD worksites would occur off-site where practical. The tunnel boring machines would be serviced and maintained daily and in-situ.

The heavy vehicles required for hauling construction materials plant and equipment and construction spoil would be serviced and maintained at depots off-site as part of the normal operation of a road transport fleet.

These activities would potentially generate hazardous wastes such as waste adhesives, lubricants, cleaning agents, fuels, engine coolant and waste oil. Other waste items would include filters, batteries, hoses, tyres, oily rags and other vehicle items.

Office and crib rooms

Waste would be generated by construction staff in offices, and crib rooms and places where food is consumed onsite. This waste is mixed waste – residual waste and recyclable items and comprises paper, plastic wrapping, steel cans, aluminium cans, plastic bottles and containers, food scraps and other office waste.

Wastewater would be generated from construction workers' facilities including toilets, canteens and kitchens. No kitchen or toilet wastewater would be permitted to enter the stormwater system from a Project worksite.

Where possible, long term site offices would be plumbed into the existing municipal wastewater network, otherwise such facilities would be serviced by a package sewage treatment plant.

Water management system

Groundwater seepage into the tunnels and underground stations would be captured in the tunnel water management system. The predicted inflow rates from groundwater are low and are described in **Chapter 12 Groundwater**.

A mixture of groundwater inflow and washdown water would be discharged into the water management system. This water could contain low concentrations of contaminants such as hydrocarbons/oils, diesel, detergents, cleaning fluids and sediment.

Stormwater, dust suppression and washdown water

Stormwater, dust suppression activities and vehicle washdown water would be generated from construction areas. This water would be captured in sediment control devices and construction area retention ponds or tanks.

Much of this water would be re-used for similar purposes, with residues, grits and sludges being disposed of to waste landfill facilities. During extreme rainfall events surface water run-off would flow through the sediment control devices and discharge into waterways and creeks.

Estimated quantities of construction waste

The percentage of material present during construction which is removed from site at the end of the construction has been estimated for a number of material types and is outlined in **Table 17-5**.

Table 17-5 Estimated percentage of material removed from site during the construction period

Material Type	Percentage of Material Removed from Site During Construction	
	Lower Estimate	Upper Estimate
Concrete (excluding precast items)	1%	2%
Steel (including reinforcing)	1%	2%
Formwork*	100%	100%
Hazardous excavated material	100%	100%
Paints, chemicals and solvents	1%	5%
Oils, lubricants and grease **	5%	10%
Fire retardants	1%	5%
Cabling, conduits and ducting	1%	5%

Notes:
** Formwork is used on a temporary basis during construction and would be removed from site at the end of the construction period.*
*** The proportion of oil to be removed from site during TBM decommissioning has not been included in this table. An allocation has been included in **Table 17.7**. The exact quantity of oil removed during decommissioning of each TBM would be determined by the specifications of the TBM machine.*

Concrete, bricks, asphalt, soil and rubble, and ferrous metals are the most common materials recycled from the construction waste streams in Australia (National Waste Report, 2010).

Based on recent recovery rates for construction wastes in Queensland, it is estimated that less than 2% of concrete material and less than 5% of general demolition waste removed from site and taken to a recycling facility would be disposed of to landfill as waste.

An estimate of the anticipated quantity of material generated during construction of the Project and removed from site is outlined in **Table 17-6** and **Table 17-7**. These estimates are based on the information available in this conceptual stage of design, as well as experience on similar transport infrastructure projects.

The quantities allocated per location vary due to differences in station design and construction methodology. The actual quantities of materials removed from each worksite may differ from these initial estimates. Further investigation would be undertaken during detailed design to inform development of a waste management plan.

Table 17-6 Estimated quantities of waste generated by staff during the construction

Type of waste	Estimated rate of generation	Estimated quantity removed from site*
General waste (food scraps and other non-recyclable waste) from office and construction staff	0.6 kg / person / week	690 kg / week
Paper and cardboard waste from office staff	1.6 kg / person / week	160kg / week (recyclable)
Other recyclable waste (containers, drink bottles etc) from office and construction staff	0.3 kg / person / week	345 kg / week (recyclable)

Note:
** all worksites at peak workforce commitment, based on 100 Full Time Equivalent (FTE) office staff and 1050 FTE construction staff*

Table 17-7 Estimated total quantities of material removed from the various work sites as waste during construction

Location	**Concrete** (excl precast items) (m^3)	**Steel** (incl reinforcing) (tonne)	**Formwork** (m^2)**	**Hazardous excavated material**('000 m^3)	**Paints, chemicals & solvents** (Litres)	**Oils, lubricants & grease** (Litres)	**Fire retardants** (m^3)	**Cabling, Conduits and Ducting** (m^3)	**Packaging** (m^3)	**Waste water**** (kL / day)	**Immiscible Liquids (Oily water / sludge)** (tonne)	**Tyres** (tonne)
Mayne Rail Yard	< 100	< 20	300 – 600	1 – 1.2	< 10	< 100	< 1	< 2	< 5	< 1	100 (allocation for all locations)	25 (allocation for entire construction period)
RNA Showgrounds and O'Connell Terrace	100 – 200	< 30	900 – 1,800	1 – 1.2	< 20	< 100	< 1	< 4	< 10	< 1		
Victoria Park	< 100	< 10	300 – 600	< 0.3	< 20	< 600	< 2	< 4	< 10	< 5		
Roma Street	700 – 1,400	40 – 80	2,700 – 5,400	3 – 4	< 50	< 600	< 10	< 4	< 10	< 2		
Albert Street	500 – 1,000	60 – 120	3,000 – 6,100	4 – 4.9	<50	< 600	< 10	< 4	< 10	< 2		
Woolloongabba	200 – 400	40 – 80	2,900 – 5,700	10 – 13.2	<75	10,000 – 12,800***	< 10	< 10	< 30	< 12		
Boggo Road	800 – 1,600	60 – 120	1,200 – 2,500	10 – 12	<50	< 400	< 10	< 4	< 10	< 1		
Fairfield	< 100	< 20	500 – 1,000	1 – 1.2	< 10	< 100	< 1	< 2	< 10	< 1		
Yeerongpilly (Wilke Street)	100 – 200	< 30	400 – 900	1. 4 – 1.6	< 20	< 100	< 5	< 4	< 10	< 1		
Yeerongpilly (Lucy Street)	< 100	< 10	100 – 200	8 – 8.7	< 75	10,000 – 12,200***	< 2	< 10	< 30	< 12		
Clapham Rail Yard	<100	< 10	500 – 1,000	10 – 15.3	< 20	< 100	< 2	< 2	< 5	< 1		

Location	**Concrete** (excl precast items) (m^3)	**Steel** (incl reinforcing) (tonne)	**Formwork** (m^2)**	**Hazardous excavated material**('000 m^3)	**Paints, chemicals & solvents** (Litres)	**Oils, lubricants & grease** (Litres)	**Fire retardants** (m^3)	**Cabling, Conduits and Ducting** (m^3)	**Packaging** (m^3)	**Waste water**** (kL / day)	**Immiscible Liquids (Oily water / sludge)** (tonne)	**Tyres** (tonne)
Moorooka	<100	< 10	200 – 500	0.4 – 0.6	< 10	< 100	< 1	< 2	< 5	< 1		
Rocklea*	-	-	-	-	< 10	< 100	< 1	< 4	< 5	< 1		
Salisbury*	-	-	-	-	< 10	< 100	< 1	< 2	< 5	< 1		

Notes:
** Due to the early stages of design, quantities of waste materials from Rocklea and Salisbury stations are not able to be estimated for all waste categories*
*** Formwork is used on a temporary basis during construction and would be removed from site at the end of the construction period. It has been assumed that 5-10% of the formwork is removed as waste with >90% of the formwork removed for further use on this or other projects, along with other construction equipment, machinery and tools.*
**** An allocation has been included for oil removed during TBM decommissioning. The exact quantity of oil removed during decommissioning would be determined by the specifications of the TBM machine.*
***** Waste water includes water used in the operation of the TBMs and water used for dust suppression, but does not include sewage or grey water. Additionally, ground water seepage into tunnels has not been included in waste water as this is dependent on site conditions and cannot be estimated at present.*

17.5.3 Operational waste

The major waste streams generated during the operational phase are described in **Table 17-8** and following sections.

Table 17-8 Operations Phase Waste Types and Classification

Waste Types and Classification		
Type	**Activity**	**Waste Category/Classification**
Groundwater inflow, pavement and tunnel washdown water	Underground rail corridor infrastructure maintenance - maintenance of the tunnel and rail track	Liquid waste (tunnel water management system)
Absorbent materials and spent spill kit materials	Fuel/oil spillages from track maintenance vehicles	Regulated waste
Tunnel wastewater, sludges or residue	Tunnel wastewater treatment plant	Regulated waste
Waste paints and solvents	Infrastructure maintenance	Regulated waste
Surface water runoff	Clapham Rail Yard and other above ground rail corridor	Liquid waste
Tyres, batteries, adhesives, lubricants, cleaning agents, fuels, engine coolant, waste oil, oily rags, antifreeze and radiator coolant	Clapham Rail Yard - maintenance of the trains	Regulated waste
Electrical cable, conduit offcuts at signals	Maintenance of electrical services within the rail corridor	General solid waste potentially recyclable
General waste	General maintenance of public areas	General solid waste potentially recyclable
Empty chemical containers	General maintenance of public areas	Regulated waste
Packaging material - pallets, plastic wrapping, polystyrene products, and cardboard	General maintenance of infrastructure and buildings	General solid waste if segregated some components are potentially recyclable
Glass, aluminium cans, plastic bottles, paper, cardboard	Public place and commercial recycling bins	General solid waste potentially recyclable
General waste	Public place and commercial waste bins. Train cleaning at Clapham Rail Yards	General solid waste potentially recyclable
Kitchen waste	Restaurant and food outlets commercial kitchens	Organic/general solid waste
Office waste	Offices and commercial uses	General solid waste potentially recyclable
Green waste	Landscape vegetation maintenance activities	Green waste
Electrical insulation – SF_6 (Sulphur hexafluoride)	Maintenance of electrical equipment – electrical switchgear and control gear	Regulated waste
Silt and sediment	Maintenance of erosion and sediment control devices	General solid waste
Train debris - mixed waste such as metal, plastic, rail infrastructure	Train incidents and accidents	General solid waste potentially recyclable potential for some regulated waste

Cleaning activities: trains and public and commercial areas

Wastes collected from cleaning activities on trains and in public and commercial areas at operating stations would include the following:

- general waste
- commingled recyclables
- kitchen waste
- office waste.

Tunnel water management system

Groundwater seepage into the tunnels would be captured in the tunnel water management system. A mixture of groundwater inflow and washdown water from underground pavements and tunnels would be discharged into the tunnel water management system. This tunnel water could contain low concentrations of contaminants such as:

- hydrocarbons, oils, diesel from spills and leaks from rollingstock and maintenance vehicles
- metals from rail track grinding residue
- gross pollutants and litter from underground station passengers
- detergents and cleaning fluids from tunnel washdown activities
- sediment.

The management of the tunnel water would be incorporated into the design of the tunnel water management system. The tunnel drainage systems would discharge to a wastewater treatment plant, if required, prior to discharge to sewer or stormwater, as appropriate.

Underground rail corridor infrastructure maintenance

During the operations phase of the Project, the waste materials generated from infrastructure maintenance activities in the underground rail corridor would be:

- cable and conduit off-cuts from maintenance of track electrical infrastructure
- spent spill kit absorbent materials used to clean up spills at refuelling pads/areas
- solvents, paints, adhesives, cleaning fluids, greases, acids and alkali materials.

There is the potential for oil leaks and spillages from trains and track maintenance vehicles or debris from accidents in the rail corridor to generate waste. Waste from clean-up activities would be managed in accordance with the incident management procedures of the draft Outline EMP.

Clapham Rail Yard plant and equipment maintenance activities

During the operations phase of the Project, the waste materials generated from train maintenance activities at the Clapham Rail Yard would be:

- waste oil and greases – generated during cleaning, inspection and maintenance activities on the trains
- train maintenance consumables
- spent spill kit absorbent materials used to clean up spills at refuelling pads/areas
- solvents, paints, cleaning fluids, greases, acids and alkali materials.

Provision would be made for the storage of Dangerous Goods (including fuel and hazardous waste), according to the Dangerous Goods Codes. The storage and transportation of the hazardous waste materials would be in accordance with Australian Standards.

Transportation of hazardous wastes generated during the operations phase of the Project would be undertaken by a suitably licensed waste contractor. All regulated waste would be collected and tracked separately in accordance with legislative requirements for waste tracking. Waste tracking requirements are outlined in the *Environmental Protection (Waste Management) Regulation 2000*. Waste tracking requirements apply to any regulated waste listed in Schedule 1.

Above ground corridors

Stormwater runoff from rail corridors has the potential to become contaminated with sediment, oils, hydrocarbons and metals. The management and potential treatment of stormwater during construction is addressed in **Chapter 13 Surface Water**.

17.6 Potential impacts

Potential waste management related impacts could include the following:

- dust resulting from the inappropriate storage, handling and disposal of excavated material
- soil and water including surface water and groundwater, contamination from material spills during handling and haulage
- soil and water overflows from sediment control structures and sediment ponds during extreme rainfall events
- soil and water including surface water and groundwater, contamination from inappropriate storage, handling and disposal of solid and liquid waste and materials separated for recycling, reuse or recovery
- an increase in the incidence of vermin, insects and pests resulting from the inappropriate storage and handling of putrescible waste
- an impact on social amenity during construction as a result of poor housekeeping in construction areas
- the inefficient use of resources.

However, waste and resource recovery activities associated with the Project are not expected to pose a significant risk to the environment or public health with the implementation of effective waste management and resource recovery control measures.

17.7 Mitigation and management

17.7.1 Waste and resource recovery management actions

A WRRMP would be developed for the Project's demolition and construction, and operations phases to describe measures to be implemented during the Project to mitigate the potential impacts. This plan, discussed further in **Chapter 24 Draft Outline EMP,** would include the following components:

- training and awareness of waste management procedures for segregation of recyclable materials, storage of waste and identification opportunities to avoid waste generation and reuse material during construction
- waste stream assessment – prior to commencement of waste producing activities, specific waste management strategies would be developed for each waste stream

- identification of opportunities for resource recovery including the proposed destination for recovered materials - engage a salvaging specialist to identify opportunities in the open market for reuse, recycling or recovery of materials that are not able to be reused in the project
- identification of recycling/reuse facilities that would be used to segregate and recover demolition and waste construction materials for reuse and/or recycling
- prequalification requirements for waste/recyclables receiving facilities
- management of waste storage areas to prevent pollution
- supply chain management actions to minimise generation of solid waste and encourage recycling of unused product and off cuts
- clarification of Project roles and responsibilities relating to waste management and resource recovery
- monitoring, auditing and reporting requirements of the Recycling Policy and the guideline are to be included within the Waste and Resource Recovery Management Plan to demonstrate that reasonable avoidance, reuse, recycling and recovery measures have been undertaken to reach the agreed by weight reduction target. This target would be identified and confirmed in the detailed design phase.
- procedures for review and update.

The Waste and Resource Recovery Management Plan would develop the high level strategies detailed in this chapter into actions that are appropriate for the Project's construction and operational activities and the resulting waste streams.

17.7.2 Design and procurement considerations

Material supply

Manufacturing of building materials is energy-intensive. Therefore a product that lasts longer or requires less maintenance, usually saves energy and hence generates less solid waste over the operational life of the infrastructure.

The specification and selection of durable materials for works would be encouraged. Preference should be given to:

- materials that are sourced from sustainable resources where possible. The use of building materials that require little maintenance, eg painting, re-treatment, waterproofing, or whose maintenance would have minimal environmental impact, would be encouraged.
- implementation of alternative technology and procurement processes which includes the provision of contracts with companies encouraging sustainable waste management practices.

Waste disposal for public and commercial areas

Disposal points would be included in the design of buildings and structures associated with the Project for the users to dispose of waste items. Recycling bins and residual waste bins would be provided in public areas. Likewise adequate space in loading/unloading areas should be provided for the Project's building occupants to segregated different waste materials to facilitate recycling and resource recovery and reduce the residual waste disposed to landfill.

Waste and recyclables storage areas would be designed to facilitate ease of cleaning.

Surface water runoff

Designs for construction areas are to include measures to manage surface water runoff from construction areas and minimise impact on receiving water bodies such as:

- diversion berms to allow offsite clean water to be directed around the construction worksites
- onsite drainage designed to direct surface water runoff from construction worksites through appropriately sized water ponds to enable sediment removal from surface water runoff prior to discharge to off site water bodies
- design features to enable maintenance of water ponds.

17.7.3 Waste material from construction phase

Segregation of waste materials should be practiced by all workers so that opportunities to reuse, recycle and recover these materials can be realised. Those items that are not able to be recovered or segregated would be disposed to landfill.

Waste stream assessment

Prior to commencement of demolition activities, waste management strategies would be developed. Opportunities for reuse, recycling and recover would be identified and implemented where practicable. For example, the reuse potential of materials from residential dwellings and associated structures is considered to be high when the option of relocating entire houses is practicable. The majority of these materials from road and public utilities/services infrastructure demolition have a high potential to be recycled and/or reused.

Specific planning is required in order to inventory, on a property by property basis, likely wastes that would be generated during demolition of residential, commercial and industrial properties and other infrastructure to plan for segregation of the various types of materials. The quantity and type of waste generated during demolition works at such properties would be assessed on a property by property basis. Appropriate waste handling, resource recovery and waste management strategies would be developed during demolition planning and detailed in the Waste and Resource Recovery Management Plan.

Green waste and vegetation

Green waste can be mulched/composted and reused in erosion and sediment controls and landscape activities. However, weed species, other unwanted vegetation and other waste materials need to be managed and where possible removed from the compostable waste to maintain compost quality and avoid/limit the spread of weeds, pest plants and other unwanted materials.

Packaging materials

Through consultation with suppliers and supply agreements and contracts, suppliers would be strongly encouraged to accept returned packaging material and unused product for reuse.

Stormwater, dust suppression and washdown water runoff

Surface water runoff from construction areas has the potential to become contaminated with sediment, oils and hydrocarbons. In such instances, the captured water would be extracted with a vacuum truck and disposed at a wastewater treatment plant.

Silt from erosion and sediment control devices

Silt and sediment removed from erosion and sediment control devices has the potential to be contaminated. Due to the nature of this material, it would generally be unsuitable for reuse and would need to be disposed to landfill.

17.7.4 Waste and resource recovery storage areas

General provisions

Designated waste and resource recovery storage areas would be provided at each construction work site for sorting and segregating waste prior to collection by waste and recycling contractors. Sufficient area would be provided at each construction work site for waste and resource recovery storage, loading and unloading activities. Each storage area would be on hardstand and have a suitable containment system for the waste stream being stored.

Storage areas requiring a containment system would be bunded and drain to a sump or tank. Periodically or as required the storage area runoff would be collected by vacuum truck for transport to a wastewater treatment plant as required.

Good housekeeping and regular removal of residual waste would be practiced at waste storage areas to:

- maintain a safe and stable area for the storage of waste materials
- facilitate identification and movement of reusable items to construction materials storage areas
- minimise opportunities for vermin, insects and pests to seek shelter, feed and breed.

Hazardous materials or dangerous goods

The sound management of hazardous waste and dangerous goods would be a key component of waste management to prevent adverse environmental and health impacts.

Provision would be made at the various construction work sites for the storage of Dangerous Goods (including fuel and hazardous waste), according to the Dangerous Goods Codes. Products likely to be stored and used at compound sites or within tunnel areas include:

- petroleum or other hydrocarbon based products
- hazardous materials/dangerous goods residues and containers
- various chemicals (lubricants, cleaning agents, adhesives)
- wastewater treatment chemicals (for tunnel water treatment)
- batteries.

Material Safety Data Sheets (MSDS) would be required to be kept at the storage location of all of these hazardous materials or dangerous goods. The MSDS would be used to assess the potential impact of waste materials from the use of these materials/products and determine the disposal and waste management measures.

Hazardous materials and potential sources of hazardous wastes would be documented in the Waste and Resource Recovery Management Plan and the register of hazardous and regulated waste updated and maintained regularly. For each potential hazardous waste identified, the disposal, storage, treatment and emergency response to accidental release requirements would also be documented and implemented. The Waste and Resource Recovery Management Plan would also document the environmental toxicity and biodegradability of each potential hazardous waste identified.

Transportation of hazardous wastes, regulated wastes and contaminated soils would be undertaken by a suitably licensed waste contractor. Waste Tracking requirements are outlined in the *Environmental Protection (Waste Management) Regulation 2000*. Waste tracking requirements would apply to any regulated waste generated by the project.

The storage and transportation of the hazardous waste materials would be in accordance with Australian Standards.

Storage and transport of materials would be undertaken according to the following:

- Australian Standard (AS) 1216 Classification, Hazard identification and Information Systems for Dangerous Goods
- AS 1678 Emergency Procedure Guides – Transport
- AS 1940 Storage and Handling of Flammable and Combustible Liquids
- AS 3780 The Storage and Handling of Corrosive Substances
- AS 2809 Road Tank Vehicles for Dangerous Goods
- AS 2931 Selection of Use of Emergency Procedure Guides for Transport of Dangerous Goods
- AS 2187 Explosives – Storage, Transport and Use
- *Dangerous Goods Safety Management Act 2001*
- *Explosives Act 1999*
- *Workplace Health and Safety Act 1995*
- *National Code of Practice for the Safe Removal of Asbestos 2nd revision*.

Appropriate spill response plans would be prepared as part of the Project. The wastes from spill incidents would be managed as outlined in the incident management procedures of the EMP. Standard procedures for the storage, handling, spill response and disposal of hazardous waste would be implemented. Spill containment material and spill kits would be available for use in the event of a spill incident.

Drainage and treatment requirements for potentially contaminated runoff from hazardous waste storage areas would be incorporated into the EMP.

Sulphur Hexafluoride (SF_6)

Australian Standard AS 2791 – 1996, High-voltage switchgear and control gear - Use and handling of sulphur hexafluoride (SF_6) in high-voltage switchgear and control gear comprehensively documents end of life requirements associated with SF_6 filled electrical equipment (such as insulation, switchgear and control gear). The ENA Industry Guideline for SF_6 Management outlines:

- requirements for the removal of SF_6 filled equipment from service for disposal
- recycling and reuse of SF_6 equipment and cylinders
- recycling of SF_6 filled electrical equipment.

The Project would comply with the requirements under this industry guideline (or subsequent revisions).

Asbestos

Asbestos is likely to be encountered during demolition activities. Two types of asbestos exist, bonded and fibrous. Bonded asbestos is any product where the asbestos is bonded with cement or resin binder to make it more stable. Bonded asbestos is of low health and environmental risk when undisturbed. Fibrous asbestos is any product that contains asbestos in a dusty or fibrous form. Fibrous asbestos is a dangerous product and should only be handled by a licensed asbestos waste contractor.

The used of asbestos materials in the residential building industry occurred between the 1940s and late 1980s. In the late 1980s, production of asbestos materials ceased and in 2003 the use of all forms of asbestos was banned nationally. Asbestos materials have the potential to be present in the Project construction and demolition areas in the form of building materials.

Asbestos is not easily identifiable and therefore the potential for asbestos materials within buildings follows a general rule based on the year of the building construction. Buildings built:

- before the mid 1980s are more than likely to contain asbestos materials
- between the mid 1980s and 1990 are likely to contain asbestos material
- after the 1990s are unlikely to contain asbestos materials.

The Queensland Government, through the Department of Public Works, developed the Built Environment Materials Information Register (BEMIR) which is an electronic environmental management system containing known asbestos materials within public buildings.

Demolition plans and schedules would need to include a phase to assess whether the structure to be demolished contains asbestos material and work procedures developed accordingly. Based upon the potential adverse health impacts from handling of materials containing asbestos, all materials suspected of containing asbestos would be disposed to landfill by licensed asbestos waste contractors.

Resumed buildings and dwellings at Yeerongpilly, Royal on the Park site and the northern Albert Street construction site could potentially contain asbestos materials and therefore have the potential to generate asbestos contaminated demolition waste. The BEMIR would be consulted to identify public buildings within proposed demolition areas which may contain asbestos.

Management of contaminated soil

Appropriate disposal locations for contaminated soil such as would be excavated at the GoPrint site (proposed Gabba Station), rail corridor, Roma Street Station and Royal on the Park (onsite petrol storage) would be identified subject to the findings of the site contamination investigations.

The management of contaminated soil is discussed in **Chapter 8 Contaminated Land** and **Chapter 7 Topography, Geology, Geomorphology and Soils**. Any contaminated soil to be excavated would be subject to a Site Management Plan (SMP), and if required, include transport of the contaminated soil offsite. Where contaminated soil needs to be removed, a Disposal Permit would be required to remove the contaminated soil to an appropriately licensed landfill. If spills occur during the transport of contaminated soil, the area affected would be remediated.

The preparation or alteration of a SMP, and any removal or disposal or remediation of contaminated material would be carried out in accordance with the following guidelines and legislation:

- Department of the Environment (1998) *Draft guidelines for the assessment and management of contaminated land in Queensland*
- the EP Act as amended and other related Acts, Policies and Statutory Regulations of Commonwealth, State and Local Governments.

Further investigations would be required for onsite management of contaminated soil for properties affected by Project works. The standards for the onsite remediation of any contaminated soil would be established along with validation sampling requirements for remediation or onsite management following the acquisition of appropriate data.

Management of Acid Sulphate Soil

The likelihood and management of ASS is discussed in **Chapter 7 Topography, Geology, Geomorphology and Soils**. Subject to further investigations, an ASS management plan would be developed, incorporating best management and monitoring practices through the design, pre-construction and construction phases to eliminate or minimise environmental impacts associated with ASS. ASS mitigation measures would accord with *State Planning Policy 2/02 – Planning and Managing Development involving Acid Sulphate Soils* and the hierarchy of ASS management principles in line with the *Queensland Acid Sulphate Soil Technical Manual – Soil Management*

Guidelines (version 3.8) (2002), which include: avoidance, minimisation of disturbance, neutralisation and hydraulic separation.

In particular, the ASS management measures would specifically ensure:

- where ASS must be disturbed, soil treatment with fine agricultural lime or other neutralising agents, in accordance with the treatment rates prescribed in the ASS management plan, must be used onsite to prevent the downstream or offsite impacts from acidic leachate
- all leachate and runoff from areas excavated below 5 m AHD in known ASS areas, ASS treatment pads and stockpile areas should be adequately captured, contained, analysed and treated (if necessary) prior to offsite discharge
- all fill to be used onsite must be ASS-free or first evaluated for ASS and if found, must be treated with fine agricultural lime or other acid neutralising agents prior to use as fill, in accordance with the treatment rates prescribed in the ASS management plan.

Careful planning would be required during the design phase and implementation of suitable management/mitigation measures to minimise and adequately manage potential impacts from ASS disturbance during construction. It would also be essential to maintain and monitor the condition and performance of permanent mitigation measures that are installed during construction and for the duration of the operational phase to prevent/minimise potential impacts that may occur as a delayed impact in the future.

17.7.5 Recycling facilities

Brisbane City Council operates four transfer stations including:

- Chandler Transfer Station, Tilly Road, Chandler
- Ferny Grove Transfer Station, Upper Kedron Road, Ferny Grove
- Nudgee Transfer Station, Nudgee Road, Nudgee
- Willawong Transfer Station, Sherbrooke Road, Willawong.

Brisbane City Council provides resource recovery of the following materials:

Table 17-9 Recyclable item and qualitative market assessment

Recyclable item	BCC Transfer station			
	Chandler	Ferny Grove	Nudgee	Willawong
Oil – Used motor	✓	✓	✓	✓
Scrap metals	✓	✓	✓	✓
Batteries	✓	✓	✓	✓
Concrete, brick, roof tiles			✓	
Green wastes	✓	✓	✓	✓
Furniture and household goods	✓	✓	✓	✓

There are numerous commercial operators in South East Queensland which recycle, reuse and recover specific C&D materials such as would be generated by the Project.

The market demand for recyclable waste varies depending upon the material and is expected to fluctuate over the duration of the Project.

A qualitative assessment of the marketability of the potential recyclable items generated during the construction of the Project is provided in **Table 17-10.** Where disposal is managed by a third party licensed contractor, they would be responsible for gaining relevant approvals.

Table 17-10 Recyclable item and qualitative market assessment

Recyclable item	Potential recipient/end use	Comment on market potential
Concrete	Waste concrete would be managed via a third party licensed recycling contractor	Relatively new market Recent Department of Transport and Main Roads approval of a specification for recycled concrete use in road pavements is expected to increase the demand for recycled concrete products in the local market
Asphalt Road Base	Reuse into road base or other construction phase is becoming more common place now in Australia	A number of local commercial operators offer services for recycling asphalt or road recovery services Recycling of asphalt continues to improve in South East Queensland
Bitumen, aggregates and road base	Inert materials from road demolition would be managed via a third party licensed recycling contractor	A number of local commercial operators offer services for recycling road construction materials.
Rail track	Rail track unable to be reused would be managed via a third party licensed recycling contractor	Generally high demand from local and global market for scrap metal (ferrous and non-ferrous)
Scrap metal (ferrous and non-ferrous)	Scrap metal would be managed via a third party licensed recycling contractor	Generally high demand from local and global market for scrap metal (ferrous and non-ferrous)
Batteries	Batteries would be managed via a third party licensed recycling contractor Reprocessed into other metal products within Australia or overseas	Strong demand from scrap metal merchants in Queensland
Dismantled Timber	Managed by third party licensed contractor Demolition of older or unique structures can command good income for items such as wooden fixtures, mouldings Structural timber can be reused	Good existing markets in South East Queensland for second hand fixtures and timber. Markets for timber are reflected by their previous use
Treated Timber	Limited recycling options eg landscape treatments, fencing	Very limited options to recycle CCA treated timber in Australia Timber treated with Copper Chromium Arsenic (CCA) – would be disposed to landfill
Electrical Equipment	Managed via a third party licensed recycling contractor Bulked up and reprocessed into other metal product within Australia or more often overseas	Generally high demanded from scrap metal merchants for all kinds of electrical equipment which contain quantities of metal

Recyclable item	Potential recipient/end use	Comment on market potential
Electrical and plumbing fittings, furnishings	Managed via a third party recycling contractor	Metal fittings or furnishing would also have good demand from scrap metal merchants
Plastic – Different Grades: High Density Poly Ethylene (HDP): buckets and traffic cones. Low Density Poly Ethylene (LDP): shrink wrap & bubble wrap Polystyrene: Insulation, UPVC pipes, fittings and flooring.	Many plastics can be granulated and re-used to make new plastic products for use in Australia or overseas	Established markets for materials, generally low value
Chemicals, fuels, wastewater	Disposal and/or destruction	Existing commercial operators offer collection services for all solid and liquid hazardous materials for disposal and/or destruction Possible opportunities for reuse on site by contractor
Waste oils and hydrocarbons	Waste oil and associated products would be managed via a third party licensed recycling contractor	Established local market available to recycle this product
Tyres	Tyres would be managed via a third party licensed recycling contractor	Low value but established local market available to recycle this item
Rock	Managed by third party licensed contractor Landscaping, construction and Agriculture are all proven markets	Existing markets for materials within South East Queensland, clean uncontaminated soils will have markets Could be some potential for reuse
Top soil (clean)	Managed by third party licensed contractor Landscaping, construction and Agriculture are all proven markets	Existing markets for clean uncontaminated soils within South East Queensland Could stockpile for reuse
Heritage dwellings	Removal of heritage dwellings would be managed via a third party house removals contractor	Established local market available to reuse or recycle this item
Green waste	Green waste would be managed via a third party licensed contractor	Low value but established local market available to recycle this item
Office and crib room waste paper, cardboard, plastics, aluminium cans and metal cans	Managed by third party licensed contractor Separated for reprocessing in Australia or Overseas	Well established local markets for these materials Potential to introduce separate collection of recyclable materials from offices Generally low value as demand fluctuates
Food waste	Food waste would be managed via a third party licensed contractor Limited options if not source separated. Can be composted for reuse as a soil improver on land or small scale vermiculture (fruit and vegetable scraps only)	Very limited options other than landfilling of materials Some small scale operators may be in a position to offer services. Dependant on quality and quantity

17.7.6 Waste disposal facilities

There are three waste disposal facilities in South East Queensland that may be used for the disposal of general waste, mixed waste and regulated waste. Brisbane City Council operates one landfill in the suburb of Rochedale. There are two major commercial landfills that may be used for disposal of residual waste. These are Thiess Services' Swanbank Waste Management Facility at Swanbank near Ipswich and Veolia Environmental Services' Ti Tree Bioenergy facility at Willowbank near Ipswich. The waste may be disposed direct to landfill or via transfer stations. Each load of waste would need to meet the acceptance criteria of the particular facility.

For inert material which is being disposed to landfill, there are a range of other operators who are licensed to accept this material. The selection of a facility or facilities would be subject to commercial arrangements.

17.7.7 Decommissioning of construction worksites

Construction worksite decommissioning would be conducted in accordance with the site design drawings and a decommissioning plan for each construction worksite. The aims of the decommissioning plan would be to:

- secure the construction worksites so that they do not pose an ongoing risk to public safety
- maintain or improve the quality of the environment from the pre-construction use
- fulfil community expectations.

In this regard, the decommissioning plan would be prepared in consultation with relevant stakeholders. Items that are in good working order may be reused by the contractor would be removed from site for use on other projects or removed for sale. If appropriate, some facilities may be left in place for use during future development or post Project land use. Items that are not suitable for reuse, recycling or recovery would require disposal.

17.8 Summary

This chapter describes the waste management requirements and strategies developed for the Project. The draft outline EMP includes policy, performance criteria, implementation strategies and monitoring, auditing, reporting and corrective actions for waste management. The waste management strategy for the Project is based on the principles of avoidance, reuse, recycle, recovery and disposal.

A proportion of the excavated material is anticipated to be contaminated. The depth of contamination would be established during detailed design. In addition, some excavation works are planned in areas anticipated to be affected by ASS which would require treatment with fine agricultural lime or other neutralising agents. Quantities of contaminated soil and ASS to be taken off site would need to be determined during the detailed design phase of the Project.

Consideration should be given to salvaging and segregation onsite of construction and demolition materials to facilitate reuse, resource recovery and recycling during the demolition and construction works phase. Careful planning would be required during the design phase and construction planning and implemented during construction phase to:

- minimise double handling during resource recovery activities and promote segregation of materials by providing sufficient area for storage of segregated materials
- separate and segregate the different materials types onsite where practicable
- manage movement of excavated material within the site area and external to the site
- develop procedures to record, monitor, audit and report the offsite destination of each load of excavated material, resource recovered materials and residual waste.

Waste and resource recovery activities associated with the Project would not pose a significant risk to the environment or public health with the implementation of effective waste management and resource recovery control measures. The volume of waste generated by each of the waste streams would be determined during detailed design.

A WRRMP would be developed for the demolition and construction, and operations phases to provide measures to mitigate any potential impacts.